



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/050,171	01/18/2002	Kenichi Watanabe	020029	7623
23850	7590	04/06/2005	EXAMINER	
ARMSTRONG, KRATZ, QUINTOS, HANSON & BROOKS, LLP 1725 K STREET, NW SUITE 1000 WASHINGTON, DC 20006			WARREN, MATTHEW E	
			ART UNIT	PAPER NUMBER
			2815	

DATE MAILED: 04/06/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/050,171	Applicant(s) WATANABE	
	Examiner Matthew E. Warren	Art Unit 2815	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 January 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 8-13, 15 and 20-23 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 8-13, 15 and 20-22 is/are rejected.
- 7) ☒ Claim(s) 23 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

This Office Action is in response to the Amendment filed on January 14, 2005.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 21 and 22 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 21 and 22 recite the limitation "the wiring width, W1." There is insufficient antecedent basis for this limitation in the claim. Although the limitation renders the claim indefinite, it is assumed that "W1" refers to the width of the wiring part.

Also, claims 21 and 22 each recite a parameter "L1" but do not disclose what part of the structure has the parameter L1.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 8-13, and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable B2) in view of Lee et al. (US 6,163,074).

In re claims 9 and 15, Harada et al. shows (figs. 77A-77C) semiconductor device over Harada et al. (US 6,417,575 comprising a semiconductor substrate (1), a first interlayer insulating film (7) made of insulating material formed on the semiconductor substrate, and a first intra-layer insulating film (230) made of insulating material and formed on the first interlayer insulating film. The first intra-layer insulating film is formed with a recess reaching a bottom of the first intra-layer insulating film, the recess having a pad part (lower wide portion of pad 240 in fig. 77B) and a wiring part (upper left extension of pad 240 within layer 230d) (or see left extension in fig. 77A), continuous with the pad part, the pad part having a width wider than a width of the wiring part. Insulating regions (341) are formed in the pad area. The pad seen in fig. 77A has a near wiring area superimposed upon an extended area of the wiring part into the pad part (imaginary near wiring area if wiring part extends partially into pad part to line 240). As seen in fig. 77A, a first frame area has as an outer periphery (101) of the pad part and having a first width, and a second frame area has as an outer periphery an inner periphery (240) of the first frame area and having a second width. The device further comprises a first pad (material of 240) filled in the pad of the recess and a wiring filled in the wiring part of the recess. Harada shows (fig. 77A) all the limitations of the except the plurality of insulating regions (341) not disposed in a near wiring area superimposed upon an extended area of the wiring part into the pad part. As can be seen from the top view of fig. 77A, one insulating region (341) which is actually one continuous insulating layer surrounding the pad (240), is formed in a second frame area which has as an outer periphery an inner periphery of the first frame area. Instead, Lee et al. shows (fig.

9, 10, and 18) a semiconductor device having a pad portion (930) having a plurality of insulating regions (925 1) disposed on the bottom of the pad part. The insulating regions are disposed in a second frame area within a first frame area only. With this configuration (col. 2, lines 45-52) an improved contact pad is formed with reduced cracks. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the pad portion of Harada by forming a plurality of insulating regions on the bottom of the pad as taught by Lee to form an improved pad with reduced cracks.

In re claim 8, Harada shows (fig. 77C) a second interlayer insulating film (15) is formed on the first intra-layer insulating film, the first pad and the wiring. The second interlayer insulating film is formed with at least one via hole (lower portion of 251), the via hole being superimposed upon the first pad. A second pad (101) is formed on the second interlayer insulating film and is connected to the first pad via a region in the via hole.

In re claim 10, Lee et al. shows (fig. 18) that the insulation regions (925 I or 945 I) are not disposed in a central area on an inner side of the second frame area.

In re claim 11, Harada shows (fig. 77A) in a top view that the via (251) is included in the first pad.

In re claim 12, Lee et al. shows (fig. 18) an alternate embodiment where a plurality of insulating regions (925 I or 945 I) are disposed regularly and have a first pitch (space between the insulating regions). As seen from the drawings, the width of the first frame area (width between lines of outer periphery of pad 960 and outer

periphery of the first outside insulating region 945 I) is wider than the first pitch of the insulating regions.

In re claim 13, Lee et al. shows (fig. 10) that a wire bond step (990) is performed on the upper or second pad. The insulating regions (945 I) are not disposed in a central area on an inner side of the second frame area. In Harada (77A and 778) the via hole (251) of the upper or second pad is disposed in the central area. A contact area between the conductive wire and the second pad extends to an area on an outer side of the via hole as viewed from above because the wire bond would cover the top surface of the pad which has the via in its center.

In re claim 20, Harada shows (fig. 77B or 77C) that the bottom of the recess formed in the first intra-layer insulating film (230) is defined by the first interlayer insulating film (7).

Allowable Subject Matter

Claim 23 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Although claims 21 and 22 are rejected above over 35 USC 112, the claim contains allowable subject matter. If the 112 Rejection is overcome, the claims would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Response to Arguments

Applicant's arguments filed with respect to claims 9 and 15 have been fully considered but they are not persuasive. The applicant primarily asserts that the prior art references do not show all of the elements of the claims, specifically that Harada nor Lee disclose "a plurality of insulating regions disposed on the bottom of the pad part...the insulating regions not disposed in a near wiring area." The applicant thinks that Harada forms the insulating region in the near wiring area and that Lee does not show a near wiring area at all. The examiner believes that the combination of Harada and Lee show all of the elements of the claims. As stated in the rejection above, Harada shows an insulating region that is not formed in a near wiring area. Harada was only deficient in showing that there were a plurality of insulating regions formed in the second frame area. Lee was cited to show that a plurality of insulating regions can be formed in a second frame area. Therefore, it was not necessary for Lee to disclose the near wiring area.

Since there is confusion as to what the near wiring area of Harada is, figure 77A has been provided below with the various portions labeled. As scene from the figure below, there is a first frame area and a second frame area within the first frame area. The outer periphery of the second frame area is actually the inner periphery of the first frame area. The insulating region (341) at each corner of the pad part is located within the second frame area. There is a near wiring area that extends into the first frame area. The insulating region (341) is not formed in the near wiring area. Harada was only deficient in showing that there are a plurality of insulating regions in the second frame

area, since the insulating region (341) is actually one continuous insulating layer surrounding the pad part (240). Lee shows in figure 8 that a plurality of insulating regions (925I or 945I) are formed in a second frame area (930 or 950) and thus cures the deficiencies of Harada.

FIG.77A

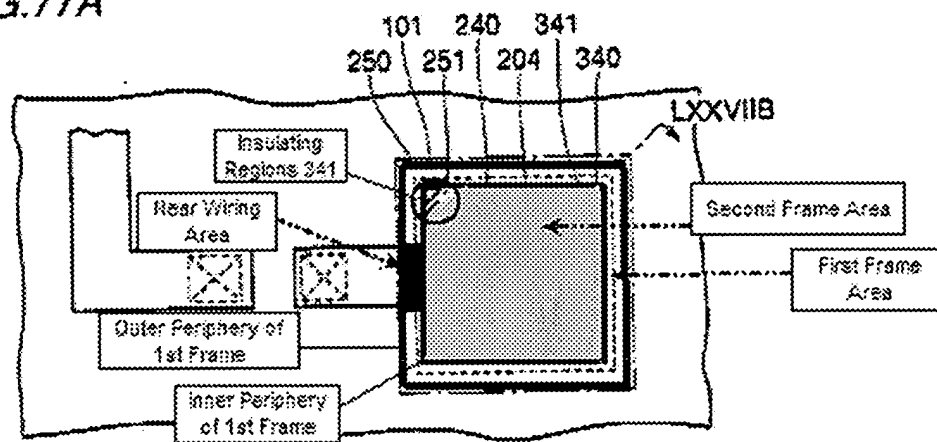
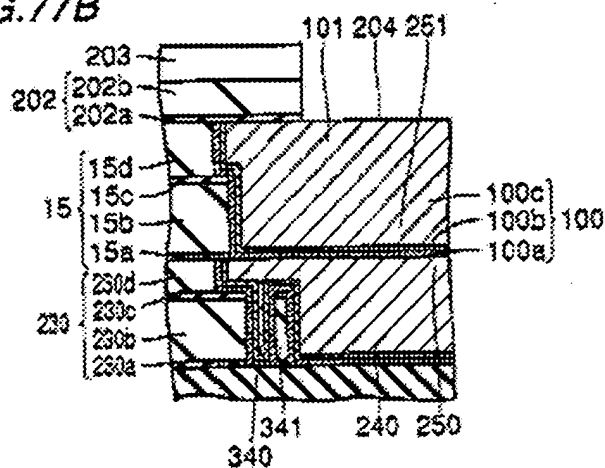


FIG.77B



Furthermore, the applicant argues that the insulating regions, first pad, and wiring of Harada are not formed in the same layer as the first intra-layer insulating film because Harada has a multi-layer structure. However, an intra-layer insulating film may comprise several films. In Harada (fig. 77) films 230a, 230b, 230c, and 230d all make up

intra-layer insulating film 230. The applicant's specification (page 9) also states that the intra-layer insulating film comprises multiple layers.

In re the arguments of claim 12, Lee discloses the recited limitations. In fig. 8 of Lee, if one were to imagine the first frame area using the outmost boundaries of the outermost insulation regions (925I) and the outer region (960) being the first frame area, then the width of that frame area would be wider than the pitch of the insulating regions. For these reasons, the cited references show all of the elements of the claims and this action is made final.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew E. Warren whose telephone number is (571)

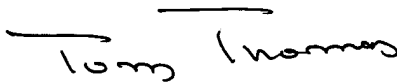
Art Unit: 2815

272-1737. The examiner can normally be reached on Mon-Thur and alternating Fri 9:00-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on (571) 272-1664. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

MEW
MEW
April 4, 2005


TOM THOMAS
SUPERVISORY PATENT EXAMINER